CHAPTER 5

WATER QUALITY PARTNERSHIPS IN THE HIWASSEE RIVER WATERSHED

5.1. BACKGROUND. The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Hiwassee River Watershed. The information presented is provided by the agencies and organizations described.

5.2. FEDERAL PARTNERSHIPS.

5.2.A. Natural Resources Conservation Service. The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance & Results Measurement System (PRMS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRMS may be viewed at http://prms.nrcs.usda.gov/prms. From the opening menu, select "Reports," then select the Conservation Treatment of interest on the page that comes up. Select the desired location and time period from the drop down menus and choose "Refresh." Choose "by HUC" in the "Location" option and choose "Refresh" again.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

CONSERVATION PRACTICE	TOTAL
Comprehensive Nutrient Management Plans (Number)	0
Conservation Buffers (Acres)	75
Erosion Reduction (Tons/Year)	10,937
Inventory and Evaluations (Number)	2
Irrigation Management (Acres)	0
Nutrient Management (Acres)	3,059
Pest Management (Acres)	2,745
Prescribed Grazing (Acres)	293
Residue Management (Acres)	1,186
Tree and Shrub Practices (Acres)	65
Waste Management (Number)	2
Wetlands Created, Restored, or Enhanced (Acres)	0
Wildlife Habitat (Acres)	1,045

Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of Hiwassee River Watershed. *Data are from PRMS for October 1, 2001 through September 30, 2002 reporting period. More information is provided in Hiwassee-Appendix V.*

5.2.B. United States Geological Survey Water Resources Programs – Tennessee District. The U.S. Geological Survey (USGS) provides relevant and objective scientific studies and information for public use to evaluate the quantity, quality, and use of the Nation's water resources. In addition to providing National assessments, the USGS also conducts hydrologic studies in cooperation with numerous Federal, State, and local agencies to address issues of National, regional, and local concern. Please visit http://water.usgs.gov/ for an overview of the USGS, Water Resources Discipline.

The USGS collects hydrologic data to document current conditions and provide a basis for understanding hydrologic systems and solving hydrologic problems. In Tennessee, the USGS records streamflow continuously at more than 89 gaging stations equipped with recorders and makes instantaneous measurements of streamflow at many other locations. Ground-water levels are monitored Statewide, and the physical, chemical, and biologic characteristics of surface and ground waters are analyzed. USGS activities also include the annual compilation of water-use records and collection of data for National baseline and water-quality networks. National programs conducted by the USGS include the National Atmospheric Deposition Program (http://bqs.usgs.gov/acidrain/), National Stream Quality Accounting Network (http://water.usgs.gov/nasqan/), and the National Water-Quality Assessment Program (http://water.usgs.gov/nawqa/).

USGS Water Resources Information on the Internet. Real-time and historical streamflow, water levels, and water-quality data at sites operated by the Tennessee District can be accessed at http://waterdata.usgs.gov/tn/nwis/nwis. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus. Contact Donna Flohr at (615) 837-4730 or dfflohr@usgs.gov for specific information about streamflow data.

Recent publications by the USGS staff in Tennessee can be accessed by visiting http://tn.water.usgs.gov/pubpg.html. This web page provides searchable bibliographic information to locate reports and other products about specific areas.

5.2.C. U.S. Fish and Wildlife Service. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with State and Federal agencies and Tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid program that distributes funds annually to States for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

Endangered Species Program. Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program. For a complete listing of endangered and threatened species in the Hiwassee River watershed, please visit the Service's website at http://www.cookeville.fws.gov.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species. Within the watershed, the Service has been actively involved in the propagation of the Federally endangered tan riffleshell (*Epioblasma florentina walkeri*). Individual juveniles were released into the Hiwassee River, in the vicinity of Appalachia Dam, to augment the existing population and to determine if propagated juvenile mussels would survive when placed in the wild.

In a partnership with the Tennessee Nature Conservancy (TNC), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Division of Natural Heritage, the Service is developing a State Conservation Agreement for Cave Dependent Species in Tennessee (SCA). The SCA targets unlisted but rare species and protects these species through a suite of proactive conservation agreements. The goal is to preclude the need to list these species under the ESA. This agreement will cover middle and eastern Tennessee and will benefit water quality in many watersheds within the State.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

Partners for Fish and Wildlife Program. The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types which benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

How To Participate:

- Interested landowners contact a “Partners for Fish and Wildlife” Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.

- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service's Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Cookeville Ecological Services Field Office at 931/528-6481 or visit their website at http://www.cookeville.fws.gov.

5.2.D. Tennessee Valley Authority (TVA). TVA's vision for the 21st century is to generate prosperity for the Tennessee Valley by promoting economic development, supplying low-cost, reliable power, and supporting a thriving river system. TVA is committed to the sustainable development of the region and is engaged in a wide range of watershed protection activities. To assist communities across the Tennessee Valley actively develop and implement protection and restoration activities in their local watersheds, TVA formed multidisciplinary Watershed Teams. These teams work in partnership with business, industry, government agencies, and community groups to manage, protect, and improve the quality of the Tennessee River and its tributaries for fishing, swimming, drinking, and recreational uses. TVA also operates a comprehensive monitoring program to provide real time information to the Watershed Teams and other entities about the conditions of these resources. The following is a summary of TVA's resource stewardship activities in the Hiwassee River watershed.

MONITORING

Fixed Station Monitoring. TVA monitors 18 major tributaries to the Tennessee River to determine the quality of water flowing out of each major watershed into the reservoir system. Half of these sites are monitored each year and provide a data base to evaluate long-term conditions. River assessments are based on fish community evaluations, benthic macroinvertebrate studies, habitat assessment, and quarterly water chemistry monitoring.

- Fish community evaluation - Backpack shockers are used to temporarily stun fish in the sample area so they can be collected in a net, identified, counted, and checked for disease. Key indicators include the number of different species and the presence of pollution-sensitive species.
- Benthic macroinvertebrate studies - Submerged rocks, logs, leaves and other bottom materials are examined to evaluate the populations of insects, mollusks, crustaceans and other invertebrates at the site.

- Habitat assessment - We check the amount of oxygen in the water and look for vegetated banks, pools and riffles, undercut banks, woody debris, spaces between rocks, and other indicators of good aquatic habitat.
- Water chemistry monitoring - Quarterly physical and chemical samples are collected. Parameters include temperature, dissolved oxygen, pH, conductivity, nutrients, metals, TSS, TDS, and TOC.

The latest evaluations and assessments of the fixed station site on Hiwassee River (River Mile 36.9) were during 2001. The site is scheduled for re-evaluation during 2003. Results from the biological analyses are rolled into the stream bioassessment database. The most recent water chemistry results from the site are:

Total Ca	Total Mn	Total Solids	Dissolved Solids	Dissolved Oxygen	Total Fe	Total P
7.4	18	50	< 1.	12	85	< 0.01
5.7	88	50	< 1.	7.7	180	0.02
4	43	30	< 1.	7.9	110	0.03
5.6	28	40	1	9	120	0.04

Total Mg	Total Cu	TOC	Organic Nitrogen	NO2+NO3-N	Temp (°C)	Hardness
2.1	< 10.	1.4		0.14	6.9	27
1.8	< 10.	4.4	0.45	0.14	21.7	22
1.2	12	1.8	0.13	0.16	20.5	15
1.5	< 10.	2.3	0.62	0.086	13.2	20.2

Total Al	Total Zn	pH	Total Nitrogen-K	NH3-N	Cond.
< 50	< 10.	7.6		0.01	66
52	170	6.9	0.47	0.02	80
< 50	13	7	0.18	0.05	42
< 50	< 10.	6.6	0.64	0.016	49

Further information on Vital Signs Monitoring can be obtained by writing to Tyler Baker at: Tennessee Valley Authority, 1101 Market Street, PSC 1X, Chattanooga, Tennessee, 37402 or calling him at 423/876-6733. E-mail address is tfbaker@tva.gov

Bacteriological sampling. Ten water samples from three sites on the Hiwassee River were analyzed for fecal coliform, and one site was also analyzed for *E. coli* in 2002. Tennessee's current water quality criteria for contact recreation are based on levels of total fecal coliform and E. coli (200 and 126 colonies 100 ml, respectively as a geometric

mean). The geometric means for all sites did not exceed state water quality criteria for water contact recreation. Currently, there are no State of Tennessee swimming advisories on the Hiwassee River. Samples were collected at the following locations:

River	Site Name	Analyses	Location	Type of Site
Hiwassee	Agency Creek	Fecal Coliform	HRM 7.3	Swim
Hiwassee	Hwy 411 Access	Fecal Coliform	HRM 42.6	Canoe access
Hiwassee	Reliance Access	Fecal Coliform, *e.coli*	HRM 48.1	Canoe access

Swimming beaches are scheduled for sampling every year and boat/canoe access every other year. Data from this sampling effort is shared in a timely manner with TDEC's Division of Water Pollution Control.

Further information on Bacteriological Sampling can be obtained by writing to Rebecca Hayden at: Tennessee Valley Authority, 1101 Market Street, PSC 1X, Chattanooga, Tennessee, 37402 or calling her at 423-876-6736. Email address is rlhayden@tva.gov

Fish Flesh Toxic Contaminants. There are no fish consumption advisories for the Hiwassee River. TVA collected channel catfish and largemouth bass from Hiwassee River at HRM 36.9 for tissue analysis in 2001. All contaminant levels were either below detectable levels or below the levels used by the states to issue fish consumption advisories.

STREAM BIOASSESSMENT

Conditions of water resources in the Hiwassee River watershed streams were measured using three independent methods; Index of Biotic Integrity (IBI), number of mayfly, stonefly, and caddisfly taxa (EPT), and Habitat Assessment. Not all of these tools were used at each stream sample site.

IBI. The index of biotic integrity (IBI) assesses the quality of water resources in flowing water by examining a stream's fish assemblage. Fish are useful in determining long-term (several years) effects and broad habitat conditions because they are relatively long-lived and mobile. Twelve metrics address species richness and composition, trophic structure (food preferences), fish abundance, and fish condition. Each metric reflects the condition of one aspect of the fish assemblage and is scored against reference streams known to be of very high quality. Potential scores for each of the twelve metrics are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site. The following table associates IBI ranges with attributes of fish assemblages.

Attributes Range	IBI
Comparable to the best situations without influence of man; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with full array of age and sex classes; balanced trophic structure.	58-60
Species richness somewhat below expectation, especially due to loss of most intolerant forms; some species with less than optimal abundance or size distribution; trophic structure shows some signs of stress.	48-52
Signs of additional deterioration include fewer intolerant forms, more skewed trophic structure (e.g., increasing frequency of omnivores); older age classes of top predators may be rare.	40-44
Dominated by omnivores, pollution-tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.	28-34
Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites, fin damage, and other anomalies regular.	12-22

EPT. As with fish, the number and types of aquatic insects are indicative of the general quality of the environment in which they live. Unlike fish, aquatic insects are useful in determining short-term and localized impacts because they are short-lived and have limited mobility. The assessment method TVA uses involves only qualitative sampling and field identification of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) to the family taxonomic level (EPT). The score for each site is simply the number of EPT families. The higher EPT scores are indicative of high quality streams because these insect larvae are intolerant of poor water quality.

Habitat Assessment. The quality and quantity of habitat (physical structure) directly affect aquatic communities. Habitat assessments are done at most stream sampling sites to help interpret IBI and EPT results. If habitat quality at a site is similar to that found at a good reference site, any impacts identified by IBI and EPT scores can reasonably be attributed to water quality problems. However, if habitat at the sample site differs considerably from that at a reference site, lower than expected IBI and EPT scores might be due to degraded habitat rather than water quality impacts.

The habitat assessment method used by TVA (modified EPA protocol) compares observed instream, channel, and bank characteristics at a sample site to those expected

at a similar high-quality stream in the region. Each of the stream attributes listed below is given a score of 1 (poorest condition) to 4 (best condition). The habitat score for the sample site is simply the sum of these attributes. Scores can range from a low of 10 to a high of 40.

1. Instream cover (fish)
2. Epifaunal substrate
3. Embeddedness
4. Channel Alteration
5. Sediment Deposition
6. Frequency of Riffle
7. Channel Flow Status
8. Bank vegetation protection - Left bank and right bank, separately
9. Bank stability - Left bank and right bank, separately
10. Riparian vegetation zone width - Left bank and right bank, separately

Stream Bioassessment Results. Between 1991 and 2001, TVA conducted 58 bioassessments on the Tennessee portion of the Hiwassee River and its tributaries. The lowermost site sampled on the Hiwassee River, HRM 37, is monitored every two years. The remaining sites are monitored on a five year rotational schedule. Several additional sites in the Hiwassee basin have been assessed for special project level activities.

The fish community at the lowermost site on the mainstem Hiwassee River, HRM 37, remained fairly consistent from 1991 through 2001, with IBI scores ranging from 42 to 48. The benthic community was sampled in 1999 and 2001 with 12 and 14 (EPT families found in those years, respectively. Several sites sampled on the Hiwassee River from below Appalachia Dam down to just above the embayed portion of the river have received fish IBI scores ranging from 38 to 54. Lower scores are encountered around HRM 63, and appear to improve downstream around mile 57, and improve still more at HRM 54 and HRM 45. Benthic communities at most of these sites rate either fair or good. The best IBI score, 54 was reported from a March 2001 sample on the Hiwassee River at Reliance Bridge, HRM 45. Diversity was excellent, with 31 native species observed, including 6 species of darters, 8 sucker species, smallmouth bass, largemouth bass, rockbass, rainbow trout, and brown trout. Greater than expected proportion of omnivores and stonerollers, and fewer than expected proportion of specialized insectivores were the only measures that didn't meet full criteria. The benthic community here, represented by 13 EPT families, also received a good rating.

Over the past 10 years several other sites on the Hiwassee and its tributaries have been sampled, but not with the frequency of the lowermost site (HRM 37). Many of these sites have been sampled only once, with a few exceptions for certain streams with historically poor water quality. Fifteen larger tributaries and four sites on the mainstem of the Hiwassee River are on the TVA five year rotational monitoring schedule and have been monitored at least two times, most recently in 2001. Most streams draining into the Hiwassee River, especially in the Polk County portion, support fair to good benthic communities. Moving downstream into Bradley and McMinn Counties the benthic community begins to show signs of degradation with a decrease in the diversity of EPT families, and an increase in the abundance of tolerant organisms, such as bloodworms, blackflies, and leeches.

Tributaries to the uppermost portion of the Hiwassee River in Tennessee are in the Blue Ridge Ecoregion and drain the Cherokee National Forest. TVA monitors three of the larger tributaries, Coker Creek, Turtletown Creek, and Spring Creek. Turtletown Creek and Spring Creek support healthy, diverse fish communities and typically receive good IBI scores. Coker Creek has had a wider variance of IBI scores over the last 8 years; in 1993 the IBI was 46; in 2000 the IBI was 52,; and in 2002 the IBI was 42. Habitat degradation in the form of increased siltation and sedimentation may be responsible for the lower IBI scores.

Moving downstream into McMinn and Bradley Counties, agricultural activities, with some urban areas, dominate land use. TVA routinely monitors the following major tributaries: Conasauga Creek, Oostanaula Creek, Chatata Creek, Chestuee Creek, South Chestuee Creek, North Mouse Creek, South Mouse Creek, Rogers Creek, Candies Creek, Gunstocker Creek, Agency Creek, Price Creek, and Sugar Creek. Most of the tributaries in this area have fish IBI scores ranging from 26 to 38. Common denominators resulting in low IBI scores are decreased overall diversity, increased abundance of tolerant species and omnivores, and higher than expected incidence of anomalies and disease. Poor habitat conditions and nutrient enrichment are the primary causes of fish community degradation. Extremely low catch rates in many of these streams also indicate some type of unidentified toxicity, perhaps associated with assorted agricultural runoff pollutants. Several of the streams in this area are also impacted from urban issues, including South Mouse Creek, North Mouse Creek, Candies Creek, and Oostanaula Creek. One bright spot in this area is Candies Creek, upstream of Cleveland near the Black Fox community. In 2001, the IBI score for this site was 54, up from its 1995 rating of 36. The diverse fish community was well represented by darters, suckers, and other species intolerant of pollution. Lower than expected catch rate and less than expected proportion of piscivores were the only measures that did not meet criteria.

Details about Stream Bioassessment sampling sites and scores can be obtained by writing Amy Wales at Tennessee Valley Authority, 1101 Market Street, PSC 1X, Chattanooga, TN 37402, or calling her at 423/876-6748. E-mail address is akwales@tva.gov

WATERSHED ASSISTANCE

Outreach. The National Clean Boating Campaign is a partnership program which highlights the importance of clean water so boating will continue to be fun for future generations. The program demonstrates how boaters can be good stewards of their water environment through best boating and marina practices. The Clean Boating Campaign on the Hiwassee River will consist of distributing materials to local marinas that expressed an interest in the program. TVA plans to continue this partnership in upcoming years by working with the marinas and other concerned individuals.

The Tennessee Valley Clean Marina Initiative is an effort by TVA to promote environmentally-responsible marina practices. This voluntary program, established in support of the National Clean Boating Campaign, will help marina operators protect the

resource that provides them with their livelihood. Plans are to implement this program on the Hiwassee River reservoirs and continue as long as it brings about positive change.

There are many special interest groups in the Hiwassee River watershed that are striving to protect the valuable land and water-based resources in the watershed through grassroot efforts. TVA is supporting these groups by providing speakers for their meetings, detailed technical support, and limited financial support for resource improvement activities. TVA is providing assistance to the North Mouse Creek/Spring Creek Watershed District. The District is undertaking efforts to improve water quality in the North Mouse Creek watershed by cooperatively funding water quality improvement activities in the rural community.

Protection and restoration activities. TVA is applying the Integrated Pollutant Source Identification (IPSI) process to various Hiwassee River tributary watersheds. IPSI is a geographic database and set of tools designed to aid citizens and planners in implementing water quality improvement and protection projects within a watershed. It is also designed to aid water quality agencies in implementing the water quality based approach to pollution control. The geographic data base consists of information on watershed features, such as land use/land cover, stream and road bank erosion sites, and other known or suspected sources of nonpoint pollution. This process has already been completed on North Mouse and Oostanaula Creeks to look and urban and rural impacts to water quality. Over the next few years, IPSI will likely be implemented in South Mouse, Candies and Chatata Creeks.

During 2002, TVA undertook a program to analyze riparian zone and stream bank conditions along South Mouse Creek. Backlying land uses, vegetation type and locations of pipes were used to score the riparian zones. Substrate type and aesthetics were used to score streambanks. The scores are being utilized as a “low tech” method to develop cost-effective riparian zone and streambank enhancements programs.

Further information on Watershed Assistance can be obtained by writing to Gary Springston at: Tennessee Valley Authority, 1101 Market Street, PSC 1X, Chattanooga, Tennessee, 37402 or calling him at 423/876-6746. E-mail address is glspringston@tva.gov

5.2.E. USDA – Forest Service. The USDA Forest Service manages approximately 640,000 acres in Tennessee (Cherokee National Forest (CNF)). This ownership includes about 81,000 acres within the Hiwassee River Watershed in Tennessee. The general mission of the Forest Service is to achieve an ecological and sustainable multiple use approach to land management that meets the diverse needs of people. In order to achieve this mission, a watershed-based approach to ecosystem management has been adopted.

A variety of management activities occur within the Hiwassee River watershed on national forest lands. Some of these include:

Ecosystem Management and Restoration. Prescribe burning and vegetation treatments are used to meet a variety of ecosystem-based management objectives. Each year,

prescribed fire is used to reduce hazardous fuel loads and improve wildlife habitat conditions within the watershed on CNF lands. Thinning and regeneration cuts are also used on selected areas where timber harvest is necessary to achieve restoration objectives. The Hiwassee River Watershed has been severely impacted by the southern pine beetle in the past three years. In the foreseeable future, restoration efforts will focus on needs associated with stands damaged by the southern pine beetle.

Inventory and Monitoring. There are 67 perennial streams capable of supporting fish and approximately double that number of perennial and intermittent streams that support other aquatic organisms in the Hiwassee River Watershed on National Forest system lands. Three-pass electrofishing and instream habitat surveys are conducted within each stream approximately once every ten years. Since 1997, twenty surveys have been conducted in the Hiwassee River Watershed. A total of 77 species of fish have been documented in these streams including three federally listed species: Cumberland bean pearly mussel, tan riffleshell mussel, and snail darter. These rare species are monitored every year using snorkeling and dead shell collecting. Other rare species have been identified as extirpated from a portion of the watershed (blotchside logperch and several mussels). Re-introduction proposals are being developed for some of these species.

The aquatic habitat surveys document physical characteristics in the stream. Degraded conditions are identified and corrected as needed. The most frequently documented degradation is a lack of large wood in the stream channel. Twenty log structures have been installed into Smith Creek to alleviate a portion of this problem.

In addition to the habitat surveys conducted in association with the electrofishing surveys, the Forest Service occasionally conducts basin wide surveys. These surveys evaluate the same physical characteristics but cover the entire watershed. In 2001 Spring Creek and Gee Creek were surveyed.

Other Management Activities. A variety of additional management activities occur within the Hiwassee River watershed on national forest lands. These include:

- Collaborative planning with a variety of other Federal, State and local agencies and private individuals to identify and prioritize watershed improvement needs on public and private lands

- Watershed improvements including road and trail decommissioning to reduce soil loss and sediment yield

- Providing a variety of land and water-based recreation opportunities such as hunting, fishing, sightseeing, trail use and whitewater sports

- Environmental education programs with school, scouting and other groups

Further information about the Cherokee National Forest can be found on its homepage at http://www.southernregion.fs.fed.us/cherokee.

5.3 STATE PARTNERSHIPS.

5.3.A. TDEC Division of Water Supply. The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

1) Delineate the drinking water source protection area
2) Inventory known and potential sources of contamination within these areas
3) Determine the susceptibility of the water supply system to these contaminants
4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
5) Implement management measures to prevent, reduce or eliminate threats
6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst {limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and spring} since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions are available until 2004). The assessments are intended to enhance the protection of drinking water supplies

within existing programs at the federal, state and local levels. Source water assessments were mandated and funded by Congress. Source water protection will be left up to the individual states and local governments without additional authority from Congress for that progression.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at http://www.state.tn.us/environment/dws as well as other information regarding the Source Water Assessment Program and public water systems.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305b Water Quality Report at http://www.state.tn.us/environment/water.htm. The intent of this report is to provide the public with an overall characterization of ground water quality and hydrogeology for Tennessee.

5.3.B. TDEC Division of Community Assistance. The Division of Community Assistance administers the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. The Division of Community Assistance has awarded loans totaling approximately $550 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility, whichever is shorter.

The Division of Community Assistance maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process

of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

For further information about Tennessee's Clean Water SRF Loan Program, contact the Division of Community Assistance by telephone at (615) 532-0445 or visit their Web site at http://www.state.tn.us/environment/dca.

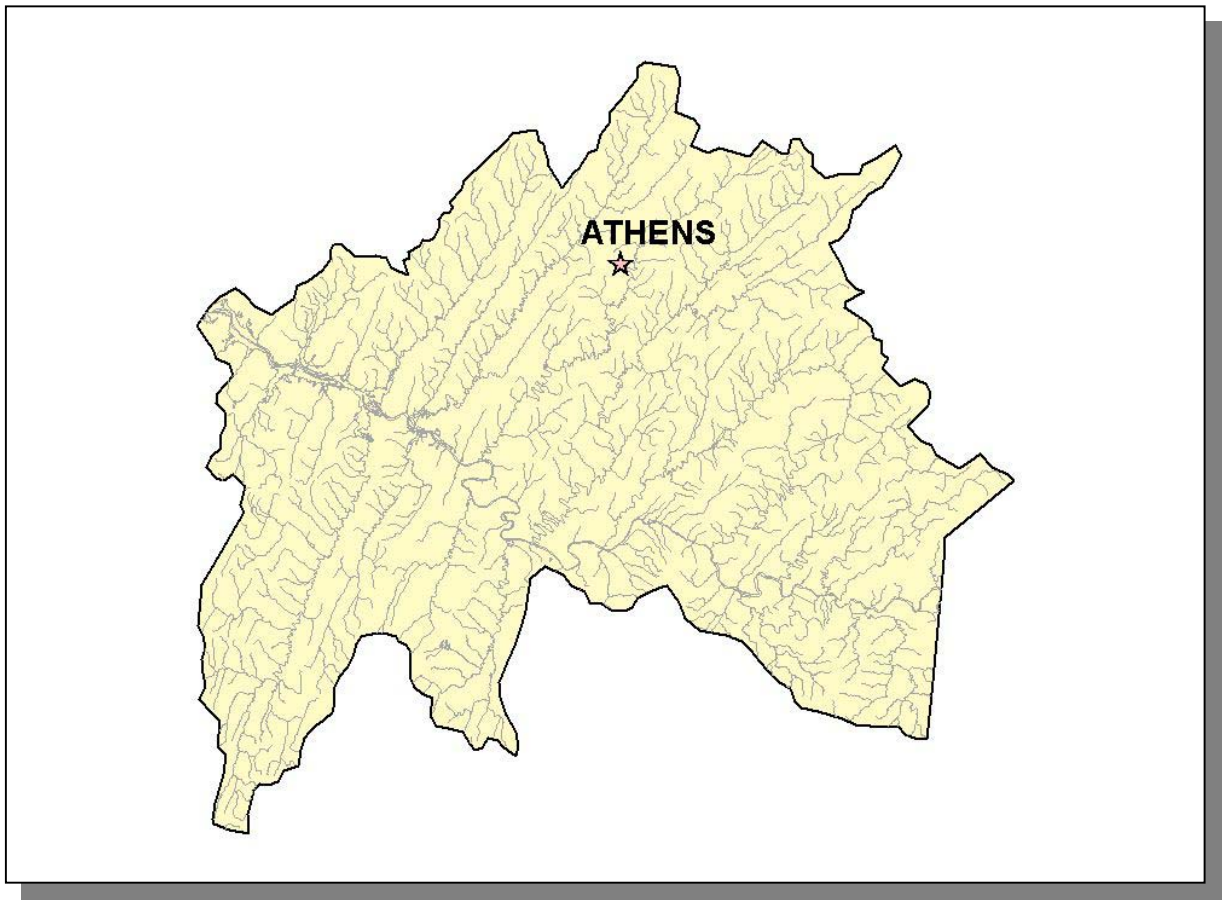

Figure 5-1. Location of Communities Receiving SRF Loans or Grants in the Tennessee portion of the Hiwassee River Watershed. *More information is provided in Hiwassee-Appendix V.*

5.3.C. Tennessee Department of Agriculture. The Tennessee Department of Agriculture's Water Resources Section consists of the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- BMP Implementation Projects. These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.

- Monitoring Projects. Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Hiwassee River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program, and the U.S. Environmental Protection Agency Assistance Agreements C9994674-99-0, C9994674-00-0, and C9994674-01-0.

- Educational Projects. The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the

TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information about the joint policy to address Bad Actors in forestry operations is available at http://www.state.tn.us/environment/news/release/jan99/badact.htm

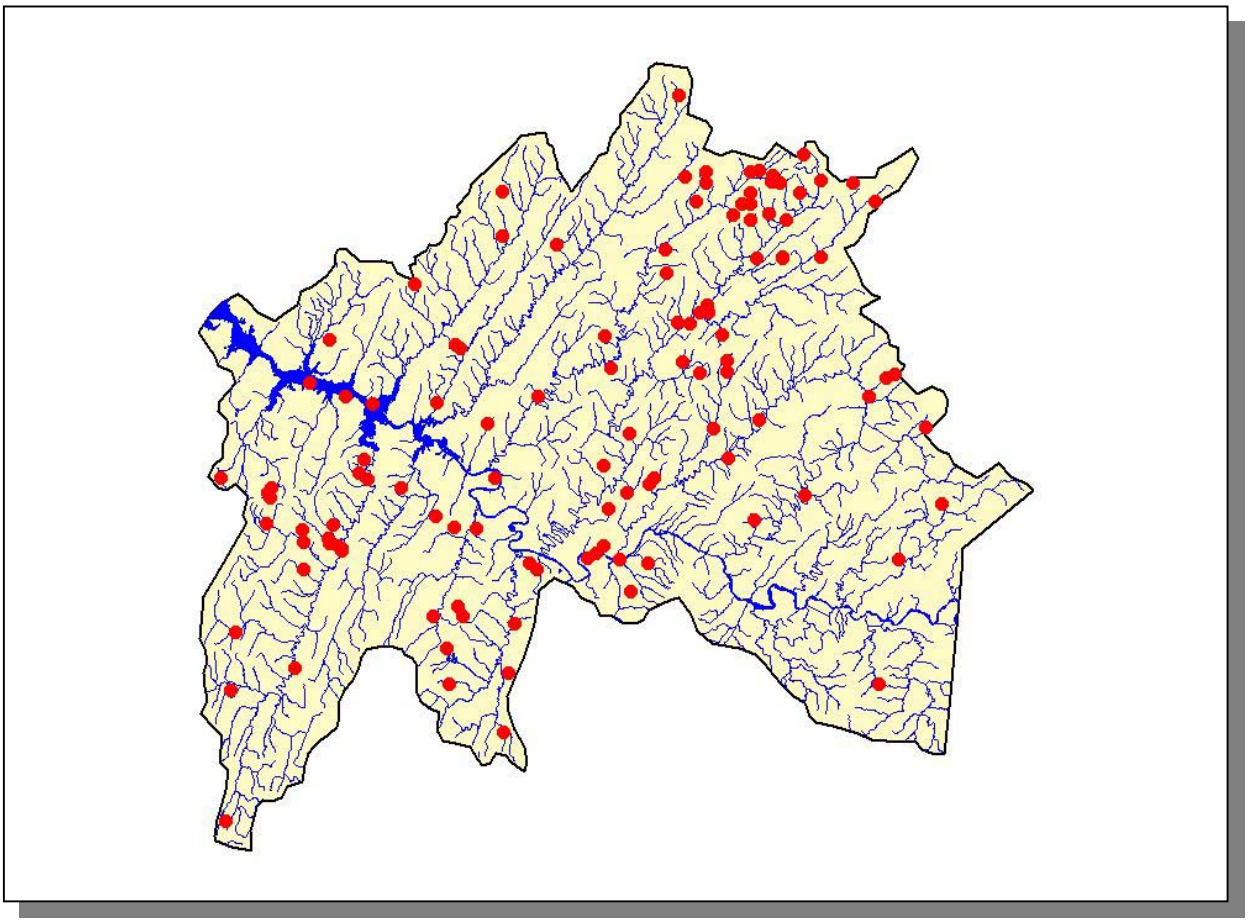

Figure 5-2. Location of BMPs installed from 1999 through 2002 in the Tennessee Portion of the Hiwassee River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs.

5.3.E. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Basinwide planning is a non-regulatory watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. In an approach similar to that employed in the State of Tennessee, the North Carolina Division of Water Quality (DWQ) prepares water quality plans for each of 17 major river basins in the state according to a defined schedule. The plans are prepared in order to communicate to policymakers, the regulated community and the general public the state's rationale, approaches and long-term management strategies for each river basin. Each plan is circulated for public review and presented at public meetings in the basin. After implementation, the plans are re-evaluated, based on follow-up water quality monitoring, and updated at five-year intervals.

DWQ initiated basinwide planning activities in 1990, when it began conducting water quality monitoring for the first basinwide plan, published in 1993. Since then, DWQ has produced plans for all 17 river basins and has begun to update those plans for each basin. The new plans emphasize changes in water quality and give the status of recommendations made in the previous plan. The first *Hiwassee River Basinwide Water Quality Management Plan* was published in 1997; DWQ updated this plan in 2002.

Overview of the North Carolina Portion of the Hiwassee River Basin. In the North Carolina portion of the basin, the Hiwassee River and its two major tributaries, the Nottely and Valley Rivers, drain more than 400,000 acres (644 square miles) of Clay and Cherokee counties in the southwestern corner of the state. Water flow is regulated by the Tennessee Valley Authority (TVA) for flood control and the production of hydroelectric power via three impoundments: Chatuge Lake on the Georgia-North Carolina state line near Hayesville; Hiwassee Lake near Murphy; and Apalachia Lake adjacent to the Tennessee border.

Almost 70 percent of the basin is forested, and only about three percent of land falls into the urban/built-up category. Over a 15-year period between 1982 and 1997, the amount of forest and cultivated cropland in the basin decreased significantly, while the amount of developed land more than doubled (+14,700 acres). Land used for pasture also increased over the 15-year time frame (+4,000 acres). Population of the basin, based on 2000 census data, is estimated to be 31,271. Population is expected to increase approximately 28 percent to 40,063 over the next twenty years. While the resident population may be fairly low, the basin experiences significant seasonal population fluctuations from recreation and tourist travel.

The Hiwassee River basin contains 72 plant and animal species that are endangered, threatened, of special concern, or considered significantly rare by the NC Natural Heritage Program. Twenty-five of these are aquatic, including several endemic species that rely on good water quality as well as the basin's unique ecological conditions.

Assessment of Water Quality. In a manner similar to that employed by TDEC, surface waters in North Carolina are classified according to their best intended uses. Determining how well a waterbody supports its uses (*use support* status) is an important method of interpreting water quality data and assessing water quality. Surface waters are rated *fully supporting* (FS), *partially supporting* (PS) or *not supporting* (NS). The ratings refer to whether the classified uses of the water (i.e., aquatic life protection, primary recreation and water supply) are being met. For example, waters classified for

fish consumption, aquatic life protection and secondary recreation (Class C for freshwater) are rated FS if data used to determine use support meet certain criteria. However, if these criteria were not met, then the waters would be rated as PS or NS, depending on the degree of degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, having inconclusive data, or for which criteria have not been developed, are listed as not rated (NR).

DWQ also assesses ecosystem health and human health risk through the development of use support ratings for six categories: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. These categories are tied to the uses associated with the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the six use support categories. For many waters, a use support category will not be applicable (N/A) to the use classification of that water (e.g., drinking water supply is only applied to Class WS waters).

Currently, there are no impaired waters in the North Carolina portion of the Hiwassee River basin (Figure 5-3).

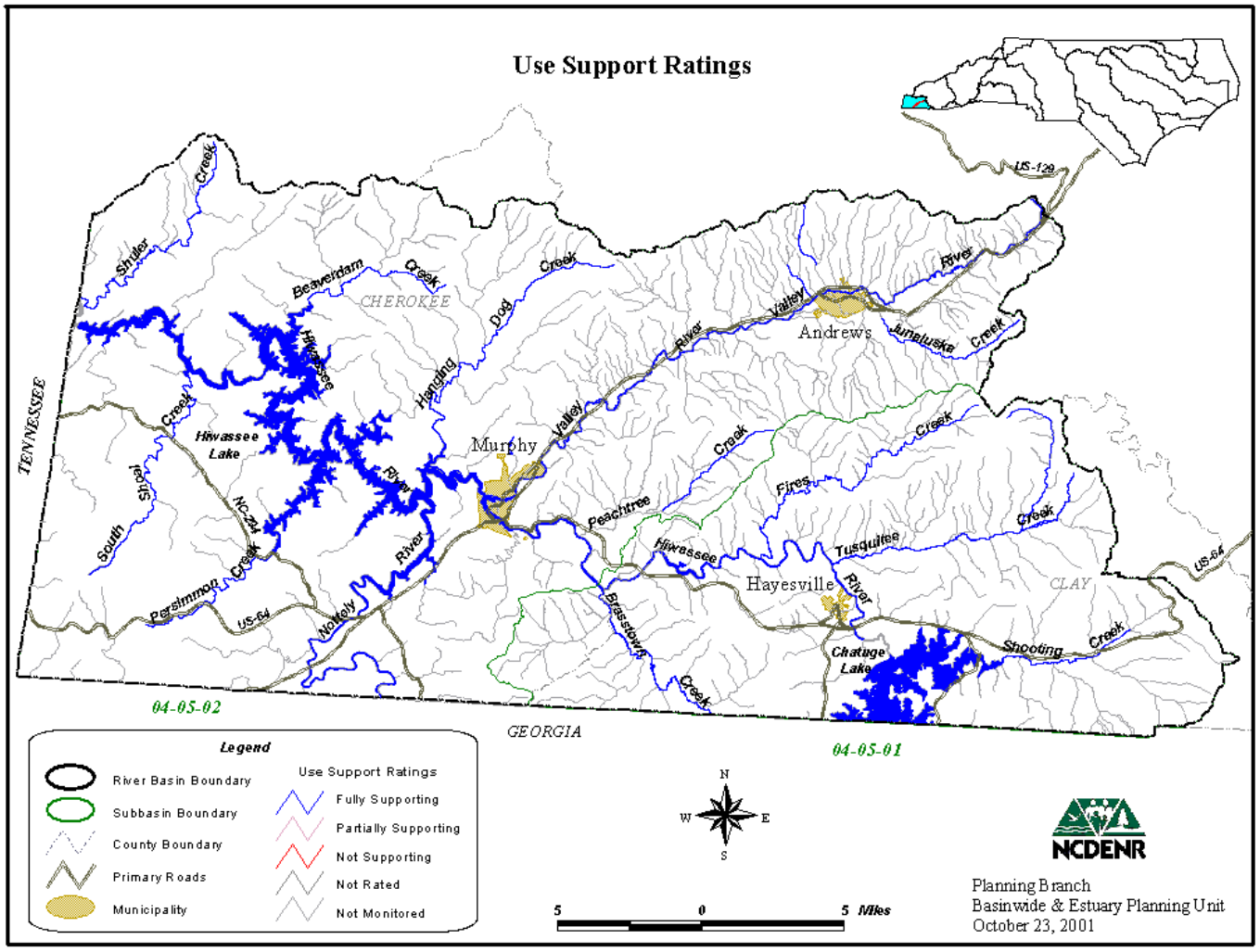

Figure 5-3. Use Support Ratings in the North Carolina Portion of the Hiwassee River Basin.

Aquatic Life/Secondary Recreation. The aquatic life/secondary recreation use support category is applied to all waters in North Carolina. Therefore, this category is applied to the total number of stream miles (967.6) and lake acres (10,847.8) in the North Carolina portion of the Hiwassee River basin. Approximately 21 percent of stream miles (204.3) and 100 percent of lake acres were monitored for the protection of aquatic life and secondary recreation by DWQ during this basinwide planning cycle. In this category, there are currently no impaired waters in the North Carolina portion of the Hiwassee River basin. A basinwide summary of current aquatic life/secondary recreation use support ratings is presented in Figures 5-4 and 5-5.

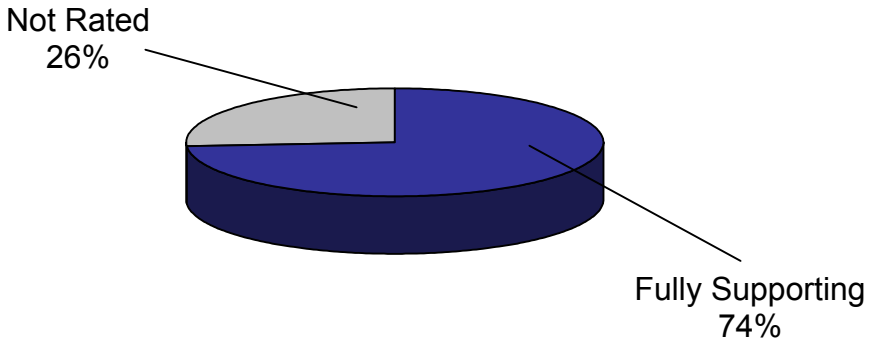

Figure 5-4. Aquatic Life/Secondary Recreation Use Support Ratings for Streams in the North Carolina portion of the Hiwassee River Basin (1999)

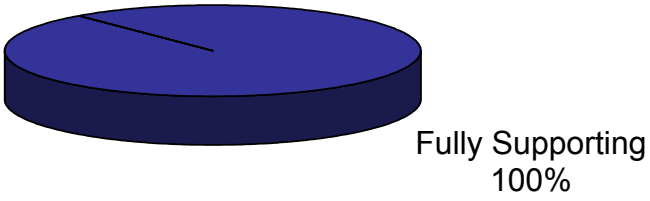

Figure 5-5. Aquatic Life/Secondary Recreation Use Support Ratings for Lakes in the North Carolina portion of the Hiwassee River Basin (1999)

Fish Consumption. Like the aquatic life/secondary recreation use support category, fish consumption is also applied to all waters in the state. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services. Currently, there are no fish consumption advisories specific to the NC portion of the basin. Therefore, all waters are considered to be fully supporting the fish consumption category. No waters were monitored for fish

consumption during this basinwide cycle because of the lack of any significant contaminant concerns in the Hiwassee River basin.

Primary Recreation. There are 30.3 stream miles and 10,847.8 lake acres currently classified for primary recreation (Class B) in the Hiwassee River basin. All (100 percent) were monitored by DWQ and the Tennessee Valley Authority over the past five years. Primary recreation use support ratings are based on swimming advisories issued by the NC Department of Health and Human Services (NCDHHS). Currently, there are no swimming advisories in the Hiwassee River basin and all waters classified for primary recreation are fully supporting. A basinwide summary of current use support ratings for primary recreation waters is presented in Figure 5-6.

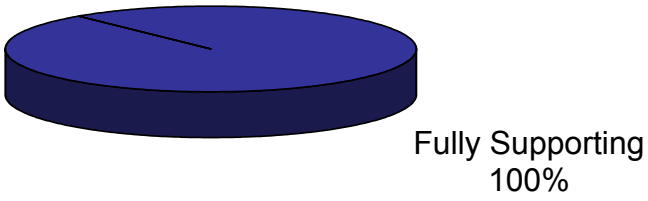

Figure 5-6. Primary Recreation Use Support Summary Information for All Class B Waters in the Hiwassee River Basin (1999)

Water Supply. There are 163.3 stream miles currently classified for water supply in the Hiwassee River basin. Approximately 79 percent of stream miles (128.4) were monitored within the past five years; all are fully supporting the water supply use. A basinwide summary of current water supply use support ratings is presented in Figure 5-7.

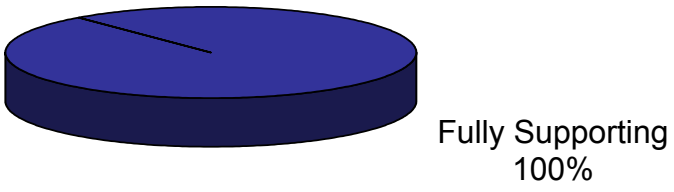

Figure 5-7. Water Supply Use Support Summary Information for All Class WS Waters in the Hiwassee River Basin (1999)

Strategies for Addressing Notable Water Quality Impacts in Unimpaired Waters. Often during DWQ's use support assessment, water quality concerns are documented for waters that are fully supporting designated uses. While these waters are not considered impaired, attention and resources should be focused on these waters over the next basinwide planning cycle to prevent additional degradation or to facilitate water quality improvement. Waters with notable water quality concerns in the Hiwassee River basin include Town Creek, Shooting Creek, Little Brasstown Creek, Valley River and Nottely River.

The most pressing water quality concern for these streams and throughout the Hiwassee River basin is habitat degradation. Habitat degradation includes sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools or riffles, loss of woody habitat, and streambed scour. It is attributed to nonpoint source pollution. The primary sources of nonpoint source pollution in the Hiwassee River basin are runoff from construction sites, pasturelands, roads and developed areas. The task of quantifying nonpoint sources of pollution and developing management strategies for these waters is resource intensive. DWQ plans to notify local agencies and others of water quality concerns for these waters and work with them to conduct further monitoring and to locate sources of water quality protection funding for these unimpaired waters.

Local Water Quality Improvement Initiatives. There are several initiatives in the Hiwassee River basin dedicated to improving and protecting water quality. The Hiawassee River Watershed Coalition is a nonprofit, grassroots organization made up of citizens from both Georgia and North Carolina, with a mission to improve water quality in the upper Hiwassee River basin. The Coalition received a grant for $2.1 million from the Clean Water Management Trust Fund in 1998 for restoration work in the Brasstown Creek watershed. The benthic macroinvertebrate bioclassification for Brasstown Creek improved from Fair in 1994 to Good in 1999. The Coalition is now turning its focus toward the Valley River watershed.

In 1998, the Hiwassee River Basin Nonpoint Source Team (made up primarily of local natural resource agency staff) chose projects in the Town Creek and Little Brasstown Creek watersheds to implement nonpoint source pollution demonstration projects using Section 319 funds. The Clay County school system has been a particularly committed participant in the Hiwassee River Basin Nonpoint Source Team.

Additionally, there is a federally initiated interagency team of natural resource professionals in the Hiwassee River basin. The Hiwassee Interagency Team is made up primarily of federal and state agency staff from North Carolina, Tennessee, and Georgia. The team meets quarterly to discuss water quality concerns and improvement projects in the entire Hiwassee River basin. DWQ participates on this team and has found that it allows a good mechanism for coordination of monitoring and sharing of information.

Because local natural resource agency staff participate with each of these groups, there is opportunity for them to guide citizens toward real water quality improvement in the Hiwassee River basin. The work that these groups do then enhances daily agency program activities. DWQ is just one (often small) partner working to reduce nonpoint source pollution and improve water quality in this basin.

For more information concerning water quality in the Hiwassee River basin in North Carolina, visit the Basinwide Planning Program website:

http://h2o.enr.state.nc.us/basinwide/

or contact the Hiwassee River Basin Planner:

Hiwassee River Basin Planner
NC Division of Water Quality
Planning Branch
1617 Mail Service Center
Raleigh, North Carolina, 27699-1617
Phone (919) 733-5083 ext. 583
FAX (919) 715-5637

5.4. LOCAL INITIATIVES.

5.4.A. Hiwassee River Watershed Coalition The Hiwassee River Watershed Coalition is a nonprofit, grassroots organization made up of citizens from both Georgia and North Carolina. The Coalition's mission is to facilitate and coordinate water quality efforts throughout the upper Hiwassee River watershed, across political boundaries, while still honoring local initiatives. Recognizing that growth and development are increasing, the coalition promotes and encourages good development practices to maintain water quality for the future.

In 1999, the Coalition was awarded a three-year, $2.1 million grant from the North Carolina Clean Water Management Trust Fund (CWMTF) for stream and riparian restoration projects in the Brasstown Creek watershed. The coalition and its partners achieved more than 90 percent of the goals set forth in the grant proposal within the first two years of work. In 2001, the Georgia legislature awarded the Coalition a two-year grant to determine causes of environmental degradation in Chatuge and Nottely Reservoirs. The Coalition partnered with the Tennessee Valley Authority to begin work on this grant in the fall of 2001. Most recently, the Coalition received a second CWMTF grant in 2002 for stream and riparian restoration projects in the Valley River watershed.

The Coalition also partners with the Volunteer Water Information Network for a volunteer monitoring program in the basin and provides environmental education information and outreach activities in the area. Additionally, the Coalition participates with both the Hiwassee River Nonpoint Source Team and the Hiwassee Interagency Team. For more information about the Hiawassee River Watershed Coalition, contact the Executive Director:

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